Original instructions

OMRON

Type F3SP-B1P

Control Unit

For F3SN-A □□□□P□□, F3SN-B □□P□□, F3SH-A09P03, F3SR-430B □□□□, F3SJ-A □□□□P□□, F3SJ-B □□□□P25

English **USER'S MANUAL**

Thank you for purchasing F3SP-B1P Control Unit.
Please read and understand this manual before using the products.
Keep this manual ready to use whenever needed.
Only qualified person trained in professional electrical technique should handle F3SP-B1P.
Since this instruction sheet only provides general infomation, refer to the instruction manual of the sensor.
Please consult your OMRON representative if you have any questions or comments.

OMRON Corporation Jul. 2011

EC Declaration of Conformity

OMRON declares that Type F3SP-B1P is in conformity with the requirements of the following EC Directives:
- EMC Directive: 2004/108/EC
- Machinery Directive: 2006/42/EC

Standards

The F3SP-B1P received the following approvals in combination with the F3SN/F3SH/F3SR/F3SJ:
- From EU accredited body TUV-SUD Product Service GmbH:
  - EC Type-examination in accordance with the EU Machinery Directive
    Approved standards: EN61496-1, CLC/TS 61496-2 (IEC61496-2)
- From the Third Party Assessment Body UL:
  - UL Listed to U.S. and Canadian safety standards
    Approved standards: IEC61496-1, IEC61496-2,
    UL508, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.8

Precaution for Safe Use

Meanings of Signal Words
The following signal words are used in this manual.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Meaning of Alert Symbols
The following alert symbols are used in this manual.

⃠	Indicates prohibited actions
❗	Indicates mandatory actions

Alert Statements

⚠WARNING

Serious injury may possibly occur due to breakdown of safety outputs. Do not connect loads beyond the rated value tothe safety outputs.	⃠
Serious injury may possibly occur due to loss of required safety functions. Wire F3SP-B1P properly so that supply voltages or voltages for loads do NOT touch the safety inputs accidentally or unintentionally.	❗

Precautions for Safe Use

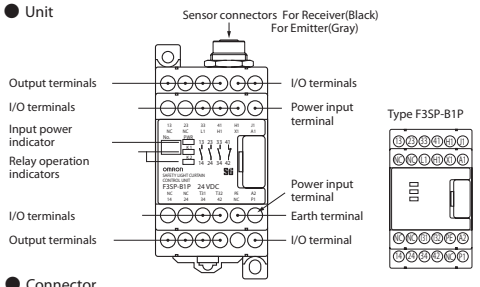
(1) When ready for wiring, the power source should be disconnected first. Further, at operating this unit, the terminal cover should be closed correctly in orde to prevent an electrical shock.
(2) Do not wire in case threat of Lightning. otherwise an electric shock may occur.
(3) Do not apply any excessive voltage or current to the input or output circuit the F3SP-B1P. Doing so may result in damage to the F3SP-B1P or cause afire.
(4) Do not apply any variable voltage, otherwise F3SP-B1P may malfunction.
(5) Do not connect any overload to the output circuit, otherwise the F3SP-B1P in operation will generate excessive heat and the output elements of the F3SP-B1P may short-circuit or fire may result.
(6) The lifetime of F3SP-B1P depends on the conditions of switching of its outputs. Be sure to conduct its test operation under actual operating conditions in advance and use it within appropriate switching cycles. Change the F3SP-B1P before expected operation. Over operation may cause may short-circuit or may malfunction.
(7) Do not operate the F3SP-B1P with flammable or explosive gass. An arc with operation and the heat of relay will cause a fire or an explosion.
(8) Do not disassemble, repair, or modify the F3SP-B1P, otherwise an electric shock may occur or the F3SP-B1P may malfunction.
(9) Use protective device (Fuse etc) for short-circuit protection and ground fault protection, otherwise a fire may occur or the F3SP-B1P may malfunction.
(10) Be sure to wire correctly. The sensor connector is the same both the emitter and the receiver.
(11) Do not dismantle, repair, or modify F3SP-B1P. it may lead to loss of its safety functions.

Precautions for Correct Use

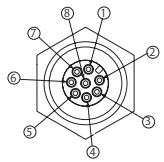
(1) For malfunctions in case that the power supply picks up gradually.
Malfunctions in case that the power supply picks up gradually. In case that the input circuits close before the power supplies, internal logic may malfunction.
(2) Handling
Do not drop the F3SP-B1P or shock or vibrate the F3SP-B1P excessively. Doing so may result in damage to the F3SP-B1P or cause F3SP-B1P to malfunction.
(3) For adhesion of solvent
Adhesion of solvent, likely Alcohol, Thinner, Trichloroethane, Gasoline, on the product should be prohibited. Such solvent cause erasing the marking and being inferior of the parts.
(4) Take appropriate and sufficient countermeasures when installing systems in the following locations. Inappropriate and insufficient measures may result in malfunction.
1. Locations subject to static electricity or other forms of noise.
2. Locations subject to possible exposure to radioactivity.
3. Locations close to power supplies.
(5) Wiring
1. Use the following to wire the F3SP-B1P.
- Stranded wire (Flexible wire): 0.75 to 1.5mm²
- Solid wire: 1.0 to 1.5mm²
2. The F3SP-B1P may malfunction or generate heat.
- Tighten each screw to a torque of 0.78 to 1.18N・m
3. PE is a ground terminal. When machine is grounded at the positive, the PE terminal should not be grounded.
4. NC terminals do not have any function. Do not wire them.
(6) Mounting multiple units
When mounting multiple units close to each other, the rated current will be 3A. Do not apply a current higher than 3A.
(7) Operating and Storage Environment
Do not operate or store the F3SP-B1P under the following conditions.
Doing so may result in damage to the F3SP-B1P or cause the F3SP-B1P to malfunction.
1. The places with direct sunlight.
2. The places with ambient temperature ranges not within -25 to 55℃.
3. The places with rapid temperature changes resulting in condensation or relative humidity ranges not within 35 to 85%RH.
4. The places with atmospheric pressure out of the range 86 to 106kpa.
5. The places with corrosive or inflammable gas.
6. The places with water, oil, or chemical sprayed on the F3SP-B1P.
7. The places with vibration or shock affecting the F3SP-B1P.
8. The places with atmosphere containing dusts, saline or metal powder.
(8) DC power supply units
In order to conform to IEC61496-1 and UL508, DC power supply unit must satisfy all the conditions mentioned in the instruction manual the sensor.
(9) Installation
1. Cabinet of F3SP-B1P should meet IP54 protection.
2. The F3SP-B1P is exclusively for F3SN-A□□□□P□□ , F3SN-B□□□□P□□, F3SH-A09P03, F3SR-430B□□□□, F3SJ-A□□□□P□□, F3SJ-B□□□□P25 series.
3. The following functions are set with two short pieces when delivered. Change wirings depending on necessary functions.
- H1-X1 short: Auto reset mode.
- T31-T32 short: EDM function is inactive.
*These combinations of wiring and function are for the use with the F3SN/F3SH or F3SJ. When in combination with the F3SR, refer to Section 5.
(10) For feedback purpose use devices with contacts capable of switching micro loads of 24VDC, 5mA.
(11) This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

1 Designation

● Unit



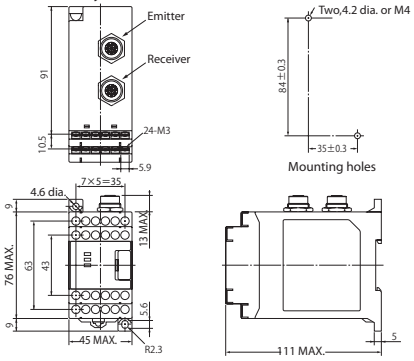
● Connector



Pin No.	Signal Name	
	Receiver	Emitter
1	OSSD 2	Interlock selection input (* Function select input)
2	+24V	+24V
3	OSSD 1	Test input
4	Auxiliary output (* Operating range select input)	Reset input
5	RS-485 (A)	RS-485 (A)
6	RS-485 (B)	RS-485 (B)
7	0V	0V
8	EDM input	NC

*Names used when connecting with the F3SR

2 External Physical Dimensions



3 For safety category and PL

The F3SP-B1P can construct the condition conforming to cat. 4 / PLe or cat.2 / PLc requested by EN ISO13849-1 with combination as follows:
- Category 4 / PLe: Type F3SN-A□□□□P□□ or F3SH-A09P03 or F3SR-430B□□□□ or F3SJ-A□□□□P□□ or F3SJ-B□□□□P25
- Category 2 / PLc: Type F3SN-B□□□□P□□

Note: Category is not judeged only by the condition above, but is judged by the condition of the whole control system.
- In order to be cat. 4/ PLe, or cat. 2/ PLc
1. The NC contact from a contactor is required to feed back signal. (Refer to the application examples. For category 2, it is not mandatory.)
2. PE terminal should be connected to protective earth.
3. In application with long term operation of devices, the F3SP-B1P must have cyclic operation every 24 hours at least in order to detect failures and a failure accumulation.

4 Functions

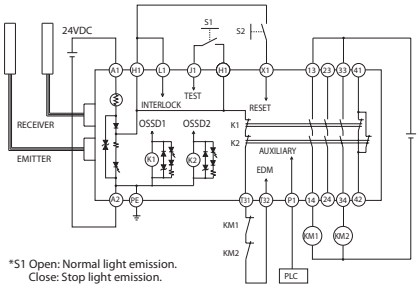
The following functions of the sensor can be used. Refer to the instruction manual of the sensor for detailed information.
- Auto reset/Manual reset (Interlock function)
- External device monitoring (EDM)
- External test (Light emission stop function by test input)
- Auxiliary output (PNP transistor output) (*)

*When in combination with the F3SR, "auxiliary output" can not be used.

5 Application examples

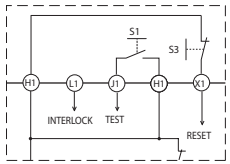
5-1 When in combination with the F3SN/F3SH/F3SJ

● Wiring for the Manual reset mode and the EDM function.



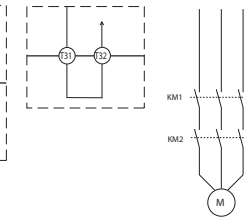
*S1 Open: Normal light emission.
Close: Stop light emission.

● Wiring for Auto-reset mode.



*S3 If the switch is not necessary, connect between X1 and H1.

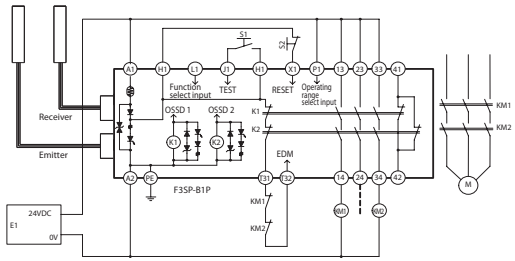
● Wiring when the EDM is not used.



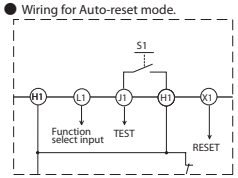
S1: External test switch
S2: Interlock / Lockout reset switch
S3: Lockout reset switch
KM1,KM2: Magnet contactor
M: 3-phase motor

5-2 When in combination with the F3SR

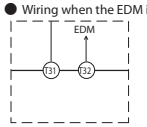
● Wiring for Manual reset mode and the EDM function enabled



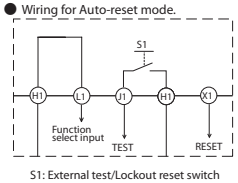
● Wiring for Auto-reset mode.



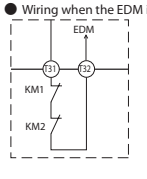
● Wiring when the EDM is not used.



● Wiring for Auto-reset mode.



● Wiring when the EDM is used.



S1: External test/Lockout reset switch
S2: Interlock reset switch
KM1,KM2: Magnet contactor
M: 3-phase motor
E1: 24 VDC power supply (S82K)

6 Specifications

● Ratings

			TYPE F3SP-B1P
Input		Rated supply voltage	24VDC
		Operating voltage range	-15% to +10% of rated supply voltage
		Rated power consumption	1.7W MAX. (Exclude sensor power)
Output	For North America	Rated load	250VAC 5A cosφ=1 30VDC 5A L/R=0ms
		Rated carry current	5A
		Max. switching voltage	250VAC 125VDC
		Max. switching capacity	AC: 1250VA DC: 150W
	For Europe	Rated load	25VAC 5A cosφ=1 30VDC 5A L/R=0ms
		Rated carry current	5A
		Max. switching voltage	25VAC 60VDC
		Max. switching capacity	AC: 125VA DC: 150W

● Characteristics

Operation time	100ms MAX. (exclude sensor response time)
Response time	10ms MAX. (exclude sensor response time)
Vibration resistance	10 to 55Hz 0.35mm single amplitude (0.7mm double amplitude)
Shock resistance	Destruction: 300 m/s² Malfunction: 100 m/s²
Ambient temperature	-10 to 55 ℃
Ambient humidity	35 to 85%RH

● Protection class

Terminals	IP20
Enclosure	IP40

● Pollution degree

External	3
Internal	2

● Isolation specification

Insulation resistance	Between inputs and outputs	100Mohm MIN. (by 500VDC Megger)
	Between different poles of output	
Dielectric strength	Between inputs and outputs	2,500VAC 1min.
	Between different poles of output	

● Life expectancy

Electrical endurance	100,000 operations MIN. Rated load Switching frequency 1,800 operations/h
Mechanical endurance	5,000,000 operations MIN. Switching frequency 18,000 operations/h

7 Failure detection

Type F3SP-B1P can detect the failure for the safety of internal circuit, parts condition and external wiring.

Failure indication by LED	Failure condition	Checking points and measures to take
K1 and K2 LED do not turn on.	Failures of the parts of the internal circuits.	Replace with a new product.
	Failures involving the wiring of External input. (input line)	Check the wiring to External input. (input line)
	Failures of the Sensor.	Check the Sensor.
	Failures of the parts of the External devices. (Contactor etc)	Replace with a new External devices. (Contactor etc)
K1 or K2 LED does not turn on.	Failures of the parts of the internal circuits.	Replace with a new product.
	Failures involving the wiring of External input. (input line)	Check the wiring to External input. (input line)
	Failures of the Sensor.	Check the Sensor.
Power LED does not turn on.	Failures of the parts of the internal circuits.	Replace with a new product.
	Failures involving the wiring of External input. (input line / power line)	Check the wiring to External input. (input line/power line)
	Supply voltage outside the rated value.	Check the supply voltage to Expansion.
All LED turn on. but the safety output doesn't on.	Failures involving the wiring of External input. (output line)	Check the wiring to External input. (output line)
	Failures of the parts of the Protective device. (Fuse etc)	Replace with a new Protective device. (Fuse etc)

Suitability for Use

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product.
Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used. Know and observe all prohibitions of use applicable to this product.
NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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